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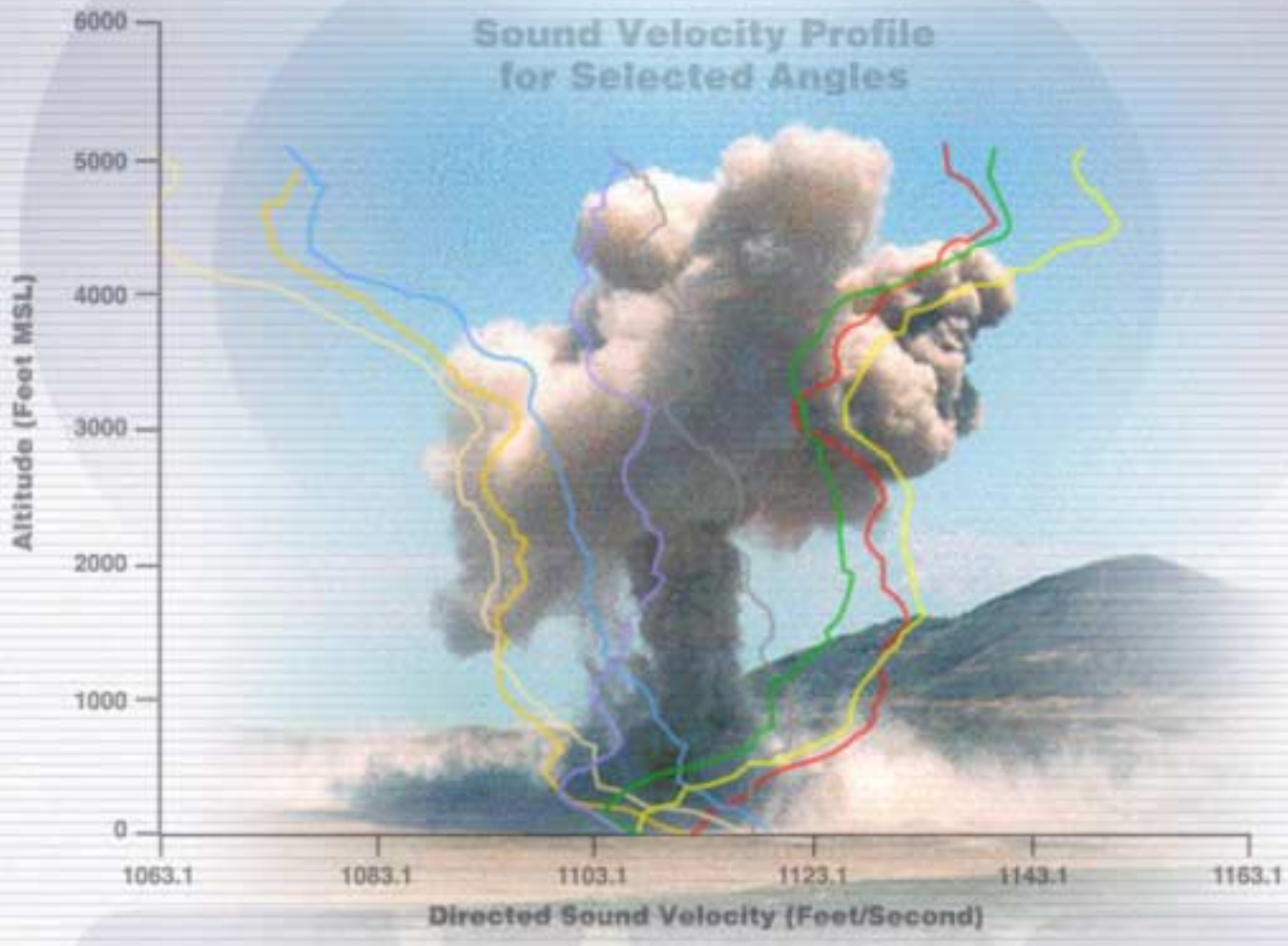

SIPS

Sound Intensity Prediction System

A NOISE COMPLAINT MANAGEMENT TOOL FOR EXPLOSIVE OPERATIONS

NAVSEA
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Mission

The Sound Intensity Prediction System (SIPS) is a tool employed to reduce complaints about noise from explosive operations at Department of Defense (DoD) facilities – whether the noise is created by testing ammunition, guns, or missiles; detonating outdated explosive materials; or even by complying with international treaties in the destruction of rocket motors. SIPS deals with the long-range propagation of impulse noise in the atmosphere.

Using data from weather balloons sent into the atmosphere near the detonation site, the SIPS computer system calculates the distribution of noise from the blast, the level of sound that may reach populated areas, and the location of high-intensity-sound pockets formed by the current atmospheric conditions. SIPS uses a combination of sophisticated computer programming with the estimated TNT equivalent charge weight, terrain maps of the area, and current atmospheric data to generate a map showing the distribution of noise around the blast site, plus plots of sound speeds versus altitude and acoustic ray traces in directions of interest. All this information is then available to the decision-maker to help determine the noise risks involved in proceeding on any given day.

SIPS also produces a long-term record of the atmospheric conditions during the blast situation and documents the reasons for not conducting a scheduled blast. As a noise complaint management tool, SIPS improves the quality of life in surrounding communities, reduces the number of noise complaints, and makes DoD facilities better neighbors.

Current Projects

Currently, SIPS is being used by various DoD facilities and customers nationwide. These facilities include:

- **Hill Air Force Base, Utah Test & Training Range (UTTR), Ogden, Utah.** In 1993, complaints from residents 80 miles away from the testing location shut down the program to destroy Poseidon second-stage rocket motors for 10 months. The Air Force was allowed to resume the program once SIPS was in place as a noise management tool to determine when conditions were right to blast without disturbing local residents. For the remainder of the Poseidon program, UTTR had only two complaints, and one of those was questionable as to the actual source of the noise.

- **Sierra Army Depot (SIAD), Herlong, California.** Anticipating stricter state noise management regulations, SIAD installed SIPS in 1998. Initially, sound level meters were installed around the facility in 1999 to compare SIPS predictions with actual data. Large-scale validation tests were conducted during Fiscal Year (FY) 2000.

- **Naval Surface Warfare Center, Dahlgren Division (NSWCDD), Dahlgren, Virginia.** In 1975, noise control and abatement became a requirement for every explosive operation at Dahlgren. Once SIPS was implemented, the number of noise complaints dropped to only three or four a year. The effects of gun directivity were added to the NSWCDD SIPS in 1991. FY2000 upgrades to SIPS included all advances from UTTR and SIAD.

- **NSWC Indian Head Division, Indian Head, Maryland.** NSWCDD's SIPS team has been working with Indian Head Division to customize the SIPS program using upper atmosphere weather data gathered at NSWC Dahlgren Laboratory. The first installation was accomplished in June 2000.

- **Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV), Stump Neck, Maryland.** SIPS was delivered to NAVEODTECHDIV in October 1999. Upper atmosphere weather data is provided by NSWC Dahlgren Laboratory.

History

Early noise control efforts for the testing of large Navy guns consisted of locating the testing range as far from a populated area as possible. The local community had a great tolerance for any noise generated in rural areas. With the growth of the U.S. population, however, noise control has become very important. Once SIPS is in place, facilities can manage their noise to improve the quality of life for their communities and thus become better neighbors.

Future of SIPS

Even though acoustic ray-tracing is a mature technique, there is much that can still be done to more fully exploit all the atmospheric data. Today's technology includes three-dimensional techniques that allow full use of propagation equations for variables such as cross winds that affect the way sounds travel. The more general formulation makes SIPS flexible for use in additional areas such as tracking a moving sound source in a changing environment or analyzing the effects of echoes and reflections as part of noise control management.

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